CLAIMS:

What is claimed is:

1. A boost converter comprising:

an input configured to receive direct current electrical energy at a first voltage;

an output configured to output direct current electrical energy at a second voltage higher than the first voltage;

a plurality of switching devices coupled in series intermediate a positive terminal of the output and a ground, wherein one of the switching devices comprises a high side switching device coupled with the positive terminal and the other of the switching devices comprises a low side switching device coupled with the ground;

drive circuitry configured to output a common control signal to control switching of the plurality of switching devices;

a capacitor configured to capacitively couple the common control signal from the drive circuitry to the high side switching device; and

wherein the control signal is configured to control the switching of the switching devices to boost the voltage of the received electrical energy of the first voltage to the second voltage.

2. The converter of claim 1 wherein only one of the first and the second switching devices is substantially conducting during voltage boost operations of the boost converter.

3. The converter of claim 1 wherein the high side switching device comprises a synchronous device.

4. The converter of claim 1 wherein the high side switching device and the low side switch device are configured in a break-before-make configuration.

5. The converter of claim 1 wherein the high side switching device is configured to provide zero-voltage switching.

6. The converter of claim 1 wherein the high side switching device uses less gate charge compared to implement switching compared with the low side switching device.

7. The converter of claim 1 wherein the high side switching device comprises a P-Channel field effect transistor and the low side switching device comprises an N-Channel field effect transistor.

8. The converter of claim 7 wherein a gate of the P-Channel field effect transistor receives pull-up current from a source of the P-Channel field effect transistor and wherein the P-Channel field effect transistor is turned OFF if a node coupling the high and low side switching devices falls below the second voltage to provide self-protection.

9. The converter of claim 7 further comprising a capacitor coupled with a gate and a source of the P-Channel switching device and configured to over-ride switching effects of a parasitic Miller capacitor of the P-Channel field effect transistor.

10. The converter of claim 1 wherein the capacitor is configured to provide voltage translation of the common control signal enabling the common control signal to control the switching devices of opposite polarity type.

11. A power supply apparatus comprising:

a first coupling configured to couple with a supply and to receive electrical energy from the supply to charge electrochemical storage circuitry;

a second coupling configured to couple with a load;

a boost converter comprising a plurality of switching devices controlled by a common control signal to implement regulation of direct current electrical energy of a first voltage from the electrochemical storage circuitry to a second voltage greater than the first voltage; and

wherein the second coupling is configured to provide the direct current electrical energy of the second voltage to the load.

12. The apparatus of claim 11 further comprising the electrochemical storage circuitry comprising a lithium cell having a lithium-mixed metal electrode.

13. The apparatus of claim 11 further comprising:

a third coupling; and

a step-down converter configured to receive direct current electrical energy from the electrochemical storage circuitry, to decrease a voltage of the electrical energy received from the electrochemical storage circuitry, and to provide the electrical energy of the decreased voltage to the third coupling for application to an other load coupled with the third coupling.

14. The apparatus of claim 11 wherein the boost converter is configured to provide operation of the switching devices wherein only one of the switching devices is substantially electrically conducting at a given moment in time during voltage boost operations.

15. The apparatus of claim 11 wherein the switching devices are coupled in series intermediate a positive terminal of the second coupling and a ground, and further comprising an inductor configured to supply electrical energy from the electrochemical storage circuitry to a common node of the switching devices.

16. The apparatus of claim 15 wherein the switching device coupled with the positive terminal comprises a synchronous device.

17. The apparatus of claim 11 wherein one of the switching devices comprises a first conductivity type and an other of the switching devices comprises a second conductivity type.

18. The apparatus of claim 17 wherein the one switching device comprises a P-Channel field effect transistor and the other switching device comprises an N-Channel field effect transistor.

19. The apparatus of claim 18 wherein the P-Channel field effect transistor and N-Channel field effect transistor are configured in a break-before-make configuration wherein the P-Channel switching device is substantially OFF before the N-Channel switching device is substantially ON.

20. The apparatus of claim 11 wherein the switching devices are configured in a break-before-make configuration wherein one of the switching devices is substantially OFF before the other of the switching devices is substantially ON.

21. The apparatus of claim 11 wherein the boost converter comprises a voltage translation capacitor configured to provide voltage translation of the common control signal before application to one of the switching devices.

22. The apparatus of claim 21 further comprising a capacitive divider coupled with the voltage translation capacitor and comprising substantially matched capacitors configured to ensure one of the switching devices comprising a high side switching device is substantially OFF before another of the switching devices comprising a low side switching device is substantially ON.

23. The apparatus of claim 21 wherein the switching devices comprise devices of opposite polarity type.

24. A power supply apparatus comprising:

electrochemical storage means for providing direct current electrical energy at a first voltage;

first interface means for coupling with a supply and for receiving electrical energy from the supply for use in charging the electrochemical storage means;

boost converter means for regulating the direct current electrical energy from the electrochemical storage circuitry to a second voltage greater than the first voltage, wherein the boost converter comprises synchronous field effect transistor means for increasing the voltage of the direct current electrical energy from the first voltage to the second voltage; and

second interface means for coupling with a load and for providing the direct current electrical energy of the second voltage to a load.

25. The apparatus of claim 24 wherein the first and the second interface means are embodied within a single connector means for providing electrical energy from the supply to the load.

26. The apparatus of claim 24 wherein the electrochemical storage means comprises at least one lithium cell having a lithium-mixed metal electrode.

27. The apparatus of claim 24 wherein the synchronous field effect transistor means comprises high side switching means and the boost converter means further comprises low side switching means, and the boost converter means comprises means for providing operation wherein only one of the high and low side switching devices is substantially electrically conducting during voltage boost operations.

28. The apparatus of claim 27 wherein the boost converter means comprises drive means for providing a common control signal to control switching of the high side and the low side switching means.

29. The apparatus of claim 28 wherein the boost converter means comprises voltage translation means for translating a voltage of the control signal before application thereof to the high side switching means.

30. An electrical energy boost method comprising:

providing direct current electrical energy at a first voltage;

first conducting the electrical energy of the first voltage using an inductor;

second conducting a first portion of the first conducted electrical energy using a first switching device;

third conducting a second portion of the first conducted electrical energy using a second switching device; and

wherein only one of the second conducting and the third conducting substantially occurs at a given moment in time to boost the voltage of the direct current electrical energy to a second voltage greater than the first voltage.

31. The method of claim 30 wherein the providing comprises providing using an electrochemical storage device.

32. The method of claim 30 wherein the providing comprises providing using an electrochemical storage device comprising at least one lithium cell having a lithium-mixed metal electrode.

33. The method of claim 30 further comprising controlling the first and the second switching devices using a common control signal to implement the second and the third conductings.

34. The method of claim 33 wherein the controlling comprises voltage translating the common control signal, and the controlling of one of the first and the second switching devices comprises controlling using the voltage translated common control signal.

35. The method of claim 30 wherein the first switching device comprises a high side device implemented as a synchronous device.

36. An electrical energy supply method comprising:

storing direct current electrical energy using an electrochemical storage device;

providing the stored electrical energy at a first voltage;

inductively coupling the provided electrical energy to a plurality of switching devices;

controlling the switching devices to operate according to a break-before-make mode of operation to increase a voltage of the provided direct current electrical energy to a second voltage greater than the first voltage; and

using an output, outputting the direct current electrical energy at the second voltage to a load.

37. The method of claim 36 wherein the controlling comprises controlling only one of the switching devices to substantially conduct electrical energy at a given moment in time.

38. The method of claim 36 wherein the controlling comprises controlling using a common control signal.

39. The method of claim 38 wherein one of the switching devices comprises a high side switching device coupled with a positive terminal of the output, and the controlling comprises capacitively coupling the common control signal with the high side switching device.

40. The method of claim 36 wherein one of the switching devices comprises a high side switching device coupled with a positive terminal of the output, and the high side switching device comprises a synchronous field effect transistor.

41. The method of claim 36 wherein the storing comprises storing using at least one lithium cell having a lithium-mixed metal electrode.